

CLAIMS

1. A method for suppressing a reduction in an endoglucanase activity in the presence of a surfactant, characterized by modifying a protein having the endoglucanase activity in which the N-terminus is an amino acid other than pyroglutamic acid, to a protein having the N-terminus of pyroglutamic acid.
2. The method according to claim 1, wherein the modification is carried out by adding pyroglutamic acid or an amino acid convertible into pyroglutamic acid, or a peptide having the N-terminus of pyroglutamic acid or an amino acid convertible into pyroglutamic acid, to the N-terminus of the protein having the endoglucanase activity in which the N-terminus is an amino acid other than pyroglutamic acid.
3. The method according to claim 1, wherein the modification is carried out by substituting pyroglutamic acid or an amino acid convertible into pyroglutamic acid, or a peptide having the N-terminus of pyroglutamic acid or an amino acid convertible into pyroglutamic acid, for the N-terminal amino acid or an N-terminal region of the protein having the endoglucanase activity in which the N-terminus is an amino acid other than pyroglutamic acid.
4. The method according to any one of claims 1 to 3, wherein the protein having the endoglucanase activity in which the N-terminus is an amino acid other than pyroglutamic acid is a cellulase belonging to family 45.
5. A modified protein having an endoglucanase activity wherein the N-terminal amino acid is converted into pyroglutamic acid by an amino acid modification.
6. The modified protein according to claim 5, which is obtainable by the method according to any one of claims 1 to 4.
7. A protein selected from the group consisting of:
 - (a) a protein comprising the amino acid sequence of SEQ ID NO: 2, 4, 38, or 40;
 - (b) a modified protein comprising an amino acid sequence in which one or plural amino acids are deleted, substituted, inserted, or added in the amino acid sequence of SEQ ID NO: 2, 4, 38, or 40, and having an endoglucanase activity whose reduction in the presence of a surfactant is small; and

(c) a homologous protein comprising an amino acid sequence having at least 85% homology with a protein comprising the amino acid sequence of SEQ ID NO: 2, 4, 38, or 40, and having an endoglucanase activity whose reduction in the presence of a surfactant is small.

8. A polynucleotide encoding the protein according to any one of claims 5 to 7.

9. A polynucleotide selected from the group consisting of:

(a) a polynucleotide comprising the nucleotide sequence of SEQ ID NO: 1, 3, 37, or 39;

(b) a polynucleotide comprising a nucleotide sequence in which one or plural nucleotides are deleted, substituted, inserted, or added in the nucleotide sequence of SEQ ID NO: 1, 3, 37, or 39, and encoding a protein having an endoglucanase activity whose reduction in the presence of a surfactant is small; and

(c) a polynucleotide hybridizing under stringent conditions to a polynucleotide consisting of the nucleotide sequence of SEQ ID NO: 1, 3, 37, or 39, and encoding a protein having an endoglucanase activity whose reduction in the presence of a surfactant is small.

10. An expression vector comprising the polynucleotide according to claim 8 or 9.

11. A host cell transformed with the expression vector according to claim 10.

12. The host cell according to claim 11, wherein the host cell is a yeast or filamentous fungus.

13. The host cell according to claim 12, the filamentous fungus is a microorganism belonging to genus *Humicola* or *Trichoderma*.

14. The host cell according to claim 13, the filamentous fungus is *Humicola insolens* or *Trichoderma viride*.

15. A process for producing the protein according to any one of claims 5 to 7, comprising:

cultivating the host cell according to any one of claims 11 to 14, and

recovering the protein from the host cell or culture obtained by the cultivation.

16. A protein produced by the process according to claim 15.